

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

**CLAIMS:**

1. A process for making an olefin product from an oxygenate feedstock in the presence of an oxygenate to olefin molecular sieve catalyst which comprises:
  - a) contacting at least a portion of the catalyst with a regeneration medium in a regeneration zone;
  - b) heating said regeneration zone to a first temperature of at least 225°C (437°F),
  - c) feeding to said regeneration zone a heating fuel having an autoignition temperature less than the first temperature and containing less than 500 wppmw sulfur and less than 200 wppm nitrogen, thereby causing the heating fuel to ignite and provide a heated catalyst;
  - d) circulating said heated catalyst to the reaction zone; and
  - e) additionally contacting the feedstock in a reaction zone with said oxygenate to olefin molecular sieve catalyst including said heated catalyst, under conditions effective to convert the feedstock into an olefin product stream.
2. The process of claim 1 wherein the olefin product stream comprises C<sub>2</sub>-C<sub>3</sub> olefins.
3. The process of claim 1 wherein the conditions are further effective to form carbonaceous deposits on the catalyst.
4. The process of claim 1 wherein said catalyst is heated to at least 316°C (600°F) in the regeneration zone prior to the step of feeding the heating fuel.

5. The process of claim 1 wherein the regeneration zone has a fuel inlet and an air inlet capable of providing an airflow through said regeneration zone, located upstream from said fuel inlet in relation to direction of said airflow, and the process further comprises (1) combusting a starting fuel with an air stream from said air inlet thereby imparting sufficient heat content within said regeneration zone to obtain said first temperature at or near the fuel inlet and (2) feeding the heating fuel through said fuel inlet.
6. The process of claim 5 wherein said starting fuel comprises natural gas.
7. The process of claim 5 wherein said starting fuel has an autoignition temperature of greater than about 482°C (900°F).
8. The process of claim 5 which further comprises filling the regeneration zone with said catalyst to a level sufficient to cover said fuel inlet before the combusting step (1), and adding additional catalyst after step (2) of feeding the heating fuel, to provide additional heated catalyst.
9. The process of claim 5 wherein the catalyst is heated to at least 316°C (600°F) in the regeneration zone prior to the feeding step (2).
10. The process of claim 8 wherein the additional catalyst is heated to at least 316°C (600°F).

11. The process of claim 1 wherein the heating fuel is a liquid fuel which contains less than 100 wppmw S and less than 100 wppmw N.
12. The process of claim 1 wherein at least 50 wt% of said heating fuel is a C<sub>11</sub>-C<sub>20</sub> hydrocarbon fraction.
13. The process of claim 1, wherein at least 75 wt% of said heating fuel is a C<sub>11</sub>-C<sub>20</sub> hydrocarbon fraction.
14. The process of claim 1, wherein at least 85 wt% of said heating fuel is a C<sub>11</sub>-C<sub>20</sub> hydrocarbon fraction.
15. The process of claim 1, wherein at least 75 wt% of said heating fuel is a C<sub>12</sub>-C<sub>19</sub> hydrocarbon fraction and further said heating fuel has an autoignition temperature ranging from 232°-271°C (450°-520°F) and contains less than 10 wppm sulfur and less than 10 wppm nitrogen.
16. The process of claim 1, wherein at least 75 wt% of said heating fuel is a C<sub>12</sub> to C<sub>16</sub> hydrocarbon fraction.
17. The process of claim 1, wherein at least 75 wt% of the heating fuel is a C<sub>12</sub> to C<sub>14</sub> hydrocarbon fraction.
18. The process of claim 1, wherein said reaction zone comprises a riser.
19. The process of claim 1, wherein said reaction zone comprises plural risers.

20. The process of claim 1, wherein said reaction zone has two risers.
21. The process of claim 1, wherein said catalyst comprises molecular sieve having a pore diameter of less than 5.0 Angstroms.
22. The process of claim 21, wherein the catalyst comprises at least one molecular sieve framework-type selected from the group consisting of AEI, AFT, APC, ATN, ATT, ATV, AWW, BIK, CAS, CHA, CHI, DAC, DDR, EDI, ERI, GOO, KFI, LEV, LOV, LTA, MON, PAU, PHI, RHO, ROG, and THO.
23. The process of claim 21, wherein the catalyst comprises at least one molecular sieve selected from the group consisting of ZSM-5, ZSM-4, SAPO-34, SAPO-17, SAPO-18, MCM-2, MeAPSO and substituted groups thereof.
24. The process of claim 1, wherein the catalyst comprises a molecular sieve having a pore diameter of 5-10 Angstroms.
25. The process of claim 24, wherein the catalyst comprises at least one molecular sieve framework-type selected from the group consisting of MFI, MEL, MTW, EUO, MTT, HEU, FER, AFO, AEL, TON, and substituted groups thereof.
26. The process of claim 1, wherein the heating step (b) occurs before the contacting step (e).

27. The process of claim 1, wherein the heating step (b) occurs concurrently with the contacting step (e).
28. The process of claim 1, wherein first contacting step (a) occurs before the heating step (b).
29. The process of claim 1, wherein said heating fuel contains less than 10 wppmsulpher and less than 10 wppm nitrogen.
30. A method of adding heat to a reactor system having an oxygenate to olefin reaction zone and a catalyst regeneration zone wherein catalyst is cycled from the reaction zone to the regeneration zone and from the regeneration zone to the reaction zone, the method comprising:  
fluidizing catalyst in the regeneration zone in the presence of an oxygen containing gas;  
heating the catalyst in said regeneration zone to a first temperature;  
introducing a heating fuel into the regeneration zone wherein the heating fuel has about 500 wppm or less of sulfur and has about 200 wppm or less nitrogen and an autoignition temperature greater than the first temperature but no greater than about 482°C (900°F) to provide a heated catalyst; and  
providing the heated catalyst into the reaction zone.
31. The process of claim 30 which further comprises:  
contacting said catalyst with an oxygenate feedstock under conditions sufficient to convert said oxygenate to an olefin-rich product and said heating fuel has about 100 wppm or less of sulfur and has about 100 ppmw or less nitrogen.

32. The process of claim 30 wherein said heating fuel contains a total of no greater than 20 wppm of metal selected from the group consisting of nickel and vanadium.
33. A process for initially increasing the temperature of a reactor system for making an olefin product from an oxygenate feedstock in the presence of an oxygenate to olefin molecular sieve catalyst which process comprises:
- a) contacting at least a portion of the catalyst with a regeneration medium in a regeneration zone;
  - b) heating said regeneration zone to a first temperature of at least 225°C (437°F),
  - c) feeding to said regeneration zone a heating fuel having an autoignition temperature less than the first temperature and containing less than 500 wppm sulfur and less than 200 wppm nitrogen, thereby causing the heating fuel to ignite and provide a heated catalyst; and
  - d) circulating said heated catalyst to the reaction zone.
34. The process of claim 33 which further comprises:
- e) additionally contacting the feedstock in a reaction zone with said oxygenate to olefin molecular sieve catalyst including said heated catalyst, under conditions effective to convert the feedstock into an olefin product stream.
35. The process of claim 33 wherein said heating fuel contains less than 100 ppm sulfur and less than 100 wppm nitrogen